

## CLAIMS

1. A plasma generating electrode comprising at least two plate-shaped unit electrodes each of which faces each other and capable of generating plasma upon application of a voltage between the unit electrodes, at least one of the unit electrodes each of which faces each other including a plate-shaped ceramic dielectric having a plurality of grooves and/or a plurality of recesses formed in at least one surface, and a conductive film disposed inside the ceramic dielectric, the plasma generating electrode capable of generating high-density plasma in the vicinity of edges formed by a surface of the ceramic dielectric and side surfaces of the grooves and/or the recesses upon application of a voltage between the unit electrodes, the high-density plasma having a density higher than that of plasma generated between the unit electrodes in an area other than the vicinity of the edges.
- 15           2. The plasma generating electrode according to claim 1, wherein the grooves and/or the recesses are formed in an area corresponding to 20 to 80% of an area of the surface of the ceramic dielectric assuming that the surface forms a continuous plane.
- 20           3. The plasma generating electrode according to claim 1 or 2, wherein each of the grooves and/or the recesses has a thickness from the surface of the ceramic dielectric to a bottom of the groove and/or the recess of 3 to 200  $\mu\text{m}$ .
- 25           4. The plasma generating electrode according to any of claims 1 to 3, wherein each of the grooves and/or the recesses has a thickness from the surface of the ceramic dielectric to a bottom of the groove and/or the recess of 1/3 or less of an average thickness of the ceramic dielectric.

5. A plasma reactor comprising the plasma generating electrode according to any  
of claims 1 to 4, and a casing having a passage (gas passage) for a gas containing a  
specific component formed therein, wherein, when the gas is introduced into the gas  
passage of the casing, the specific component contained in the gas can be reacted using  
5 plasma generated by the plasma generating electrode.

6. The plasma reactor according to claim 5, further comprising a pulsed power  
supply for applying a voltage to the plasma generating electrode.

10 7. The plasma reactor according to claim 6, wherein the pulsed power supply  
includes at least one SI thyristor.

8. A method of manufacturing a plasma generating electrode including at least  
two plate-shaped unit electrodes each of which faces each other and capable of  
15 generating plasma upon application of a voltage between the unit electrodes, the method  
comprising forming a ceramic raw material in a shape of a plate to obtain a plurality of  
unfired ceramic formed bodies, disposing a conductive film on one surface of a specific  
unfired ceramic formed body of the resulting unfired ceramic formed bodies to obtain a  
conducting-film-containing ceramic formed body, stacking the other unfired ceramic  
20 formed body on the resulting conductive-film-containing ceramic formed body so that  
the conductive film is covered to obtain a plate-shaped unit electrode precursor, forming  
a plurality of grooves and/or a plurality of recesses in at least one surface of the  
resulting unit electrode precursor to obtain a groove and/or recess-containing unit  
electrode precursor having a plurality of grooves and/or a plurality of recesses in at least  
25 one surface, firing the resulting groove and/or recess-containing unit electrode precursor  
to obtain a groove and/or recess-containing unit electrode including a plate-shaped  
ceramic dielectric having a plurality of grooves and/or a plurality of recesses in at least

one surface and a conductive film disposed inside the ceramic dielectric, and disposing the resulting groove and/or recess-containing unit electrode to be at least one of the unit electrodes each of which faces each other of the plasma generating electrode.

5        9. A method of manufacturing a plasma generating electrode including at least two plate-shaped unit electrodes each of which faces each other and capable of generating plasma upon application of a voltage between the unit electrodes, the method comprising forming a ceramic raw material in a shape of a plate to obtain a plurality of unfired ceramic formed bodies, forming a plurality of grooves and/or a plurality of recesses in at least one surface of a specific unfired ceramic formed body of the resulting unfired ceramic formed bodies and disposing a conductive film on the other surface to obtain a groove and/or recess-containing conductive-film-containing ceramic formed body, stacking the other unfired ceramic formed body on the resulting groove and/or recess-containing conductive-film-containing ceramic formed body so that the 10 conductive film is covered to obtain a plate-shaped unit electrode precursor, forming a plurality of grooves and/or a plurality of recesses in at least one surface of the resulting unit electrode precursor to obtain a groove and/or recess-containing unit electrode precursor having a plurality of grooves and/or a plurality of recesses in at least one surface, firing the resulting groove and/or recess-containing unit electrode precursor to 15 obtain a groove and/or recess-containing unit electrode including a plate-shaped ceramic dielectric having a plurality of grooves and/or a plurality of recesses in at least one surface and a conductive film disposed inside the ceramic dielectric, and disposing the resulting groove and/or recess-containing unit electrode to be at least one of the unit electrodes each of which faces each other of the plasma generating electrode.

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10. A method of manufacturing a plasma generating electrode including at least two plate-shaped unit electrodes each of which faces each other and capable of

generating plasma upon application of a voltage between the unit electrodes, the method comprising forming a ceramic raw material in a shape of a plate to obtain a plurality of unfired ceramic formed bodies, disposing a conductive film on one surface of a specific unfired ceramic formed body of the resulting unfired ceramic formed bodies to obtain a 5 conductive-film-containing ceramic formed body, stacking the other unfired ceramic formed body on the resulting conductive-film-containing ceramic formed body so that the conductive film is covered to obtain a plate-shaped unit electrode precursor, firing the resulting unit electrode precursor and then forming a plurality of grooves and/or a plurality of recesses in at least one surface of the resulting unit electrode precursor to 10 obtain a groove and/or recess-containing unit electrode including a plate-shaped ceramic dielectric having a plurality of grooves and/or a plurality of recesses in at least one surface and a conductive film disposed inside the ceramic dielectric, and disposing the resulting groove and/or recess-containing unit electrode to be at least one of the unit electrodes each of which faces each other of the plasma generating electrode.

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11. A method of manufacturing a plasma generating electrode including at least two plate-shaped unit electrodes each of which faces each other and capable of generating plasma upon application of a voltage between the unit electrodes, the method comprising forming a ceramic raw material in a shape of a plate to obtain a plurality of unfired ceramic formed bodies, disposing a conductive film having a plurality of 20 openings formed therethrough in its thickness direction on one surface of a specific unfired ceramic formed body of the resulting unfired ceramic formed bodies to obtain a conductive-film-containing ceramic formed body, stacking the other unfired ceramic formed body on the resulting conductive-film-containing ceramic formed body so that the conductive film is covered to obtain a plate-shaped unit electrode precursor, firing the resulting unit electrode precursor to obtain a groove and/or recess-containing unit 25 electrode including a plate-shaped ceramic dielectric having a plurality of grooves

and/or a plurality of recesses corresponding to a shape of the openings in the conductive film disposed on the unfired ceramic formed body in at least one surface and a conductive film disposed inside the ceramic dielectric, and disposing the resulting groove and/or recess-containing unit electrode to be at least one of the unit electrodes

5 each of which faces each other of the plasma generating electrode.